

**Field Test Program to Develop Comprehensive
Design, Operating and Cost Data for
Mercury Control Systems on
Non-Scrubbed Coal-Fired Boilers**

**Quarterly Technical Report
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ABSTRACT

With the Nation's coal-burning utilities facing the possibility of tighter controls on mercury pollutants, the U.S. Department of Energy is funding projects that could offer power plant operators better ways to reduce these emissions at much lower costs.

Mercury is known to have toxic effects on the nervous system of humans and wildlife. Although it exists only in trace amounts in coal, mercury is released when coal burns and can accumulate on land and in water. In water, bacteria transform the metal into methylmercury, the most hazardous form of the metal. Methylmercury can collect in fish and marine mammals in concentrations hundreds of thousands times higher than the levels in surrounding waters.

One of the goals of DOE is to develop technologies by 2005 that will be capable of cutting mercury emissions 50 to 70 percent at well under one-half of today's costs. ADA Environmental Solutions (ADA-ES) is managing a project to test mercury control technologies at full scale at four different power plants from 2000 – 2003. The ADA-ES project is focused on those power plants that are not equipped with wet flue gas desulfurization systems.

ADA-ES will develop a portable system that will be moved to four different utility power plants for field testing. Each of the plants is equipped with either electrostatic precipitators or fabric filters to remove solid particles from the plant's flue gas.

ADA-ES's technology will inject a dry sorbent, such as fly ash or activated carbon, that removes the mercury and makes it more susceptible to capture by the particulate control devices. A fine water mist may be sprayed into the flue gas to cool its temperature to the range where the dry sorbent is most effective.

PG&E National Energy Group is providing two test sites that fire bituminous coals and are both equipped with electrostatic precipitators and carbon/ash separation systems. Wisconsin Electric Power Company is providing a third test site that burns Powder River Basin coal and has an electrostatic precipitator for particulate control. Alabama Power Company will host a fourth test at its Plant Gaston, which is equipped with a hot-side electrostatic precipitator and a downstream fabric filter.

During the second reporting quarter, progress was made on the project in the following areas:

Alabama Power Company Plant Gaston

- Prebaseline testing was completed at Alabama Power Company's Plant Gaston.
- The bulk of the parametric testing was completed.
- Baseline Ontario Hydro stack testing was performed.
- Coal and ash sampling procedures were established for the long-term testing.
- A draft QA/QC plan was prepared and distributed for review for the long-term testing.

Wisconsin Electric Power Company Pleasant Prairie Power Plant

- Held a site kickoff meeting.
- Made several modifications to the site to accommodate the testing.
- Scheduled prebaseline/screening testing for late May or early June.
- Test plan prepared.
- Submitted information to WEPCO and received approval to include spray cooling in the testing matrix.

PG&E NEG Salem Harbor Station

- Prebaseline testing was conducted on Units 1 and 3.
- Ash and coal samples being collected and analyzed.

General

- Coordinating the fabrication of mercury control system hardware with Norit (carbon injection system) and EnviroCare (spray cooling).
- Two technical papers were prepared for presentation at the June AWMA conference.
- Abstracts for several papers related to the project were prepared and submitted for the MEGA Symposium in August.
- A presentation will be prepared for a Western Coal Conference meeting April 24-26.
- A presentation will be prepared for the ICAC annual meeting, May 3-5.
- An abstract on the project was prepared and submitted for the Clean Energy Technology Forum to be held in August.

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LIST OF GRAPHICAL MATERIALS

There are no graphical materials included in this report.

EXECUTIVE SUMMARY

ADA-ES began work on a Cooperative Agreement with the Department of Energy in October, 2000 to demonstrate full-scale mercury control systems at coal-fired power plants. The project is the next step in the process of obtaining performance and cost data on full-scale utility plants for mercury control systems. Power generating companies that have entered into contracts with ADA-ES are PG&E National Energy Group, Wisconsin Electric Power Company and Alabama Power Company. During the three-year, \$6.8 million project, integrated control systems will be installed and tested at four power plants. ADA-ES is responsible for managing the project including engineering, testing, economic analysis, and information dissemination functions.

On December 14, 2000 the Environmental Protection Agency announced that it will be developing regulations for reducing emissions of mercury from coal-fired power plants. Proposed regulations are expected to be released by December, 2003 and the rules are scheduled to be finalized by December, 2004. It is expected that EPA will include the findings from the ADA-ES/DOE project in its analysis for establishing a mercury control regulation. DOE estimates that the cost to control these emissions will be \$2-\$5 billion annually.

The field test phase of the project began at Alabama Power Company's Plant Gaston during the second reporting quarter. Field testing at this site will be completed in the third reporting quarter. Prebaseline testing was conducted at PG&E NEG's Salem Harbor Station during the quarter. Several modifications were made at the Wisconsin Electric Pleasant Prairie Power Plant to accommodate field testing scheduled for early summer and fall 2001. A number of technology transfer activities took place including preparing papers on the project for the annual AWMA meeting (June 2001), preparing abstracts for papers for the MEGA Symposium (August 2001), planning a public site visit to the WEPCO Pleasant Prairie Power Plant as part of the MEGA Symposium, committing to a project presentation at a Western Coal Council meeting (April 2001), committing to a presentation at the annual ICAC meeting (May 2001), and committing to a presentation for the Clean Energy Technology Forum (August 2001).

INTRODUCTION

Cooperative Agreement No. DE-FC26-00NT41005 was awarded to ADA-ES to demonstrate mercury control technologies on non-scrubbed coal-fired boilers. Under the contract, ADA-ES will work in partnership with PG&E National Energy Group, Wisconsin Electric Power Company, Alabama Power, and EPRI to design and engineer systems to maximize effectiveness and minimize costs to curtail mercury emissions from power plant flue gases. Reports estimate that mercury control could cost the industry from \$2 to \$5 billion per year. Much of these costs will be associated with power plants that do not have wet scrubbers as part of their air pollution control configurations. The four plants that will be evaluated during the ADA-ES program are typical of this type of application which is found at 75% of the nearly 1100 units that would be impacted by new regulations.

Detailed topical reports will be prepared for each site that is tested under the program. Quarterly reports will be used to provide project overviews and technology transfer information.

EXPERIMENTAL

Field work was conducted on the project during the second reporting quarter at Plant Gaston and Salem Harbor. Site modifications took place at Pleasant Prairie Power Plant during the quarter to install ports in preparation for receiving control system hardware over the summer. Detailed results of the testing at each power plant will be provided in separate topical reports.

Technology Transfer

The following technology transfer activities were conducted during the second reporting quarter of the project:

- Hamon Research-Cottrell, a project cost-share participant issued a press release related to their role and their cost share in the project,
- Ontario Power Generation joined the project team, is providing funds to the project and has issued a press release on the project,
- Wisconsin Electric Power Company committed to hosting a public visit to its Pleasant Prairie Power Plant (one of the project host sites) in connection with the EPRI/EPA/DOE/ICAC conference “Mercury Emissions: Fate, Effects, and Control” to be held in August, 2001,
- ADA-ES was invited to present a technical paper about the project at the Western Coal Council symposium “Burning PRB Coal: Risk Management Strategies & Tactics” to be held in April, 2001,
- A number of research and commercial organizations that are either developing mercury control sorbents or are commercial suppliers of sorbents/additives have contacted team members to be included in the project,
- ADA-ES has been invited to present a status report about the project to the annual ICAC meeting in May, 2001,
- ADA-ES has been invited to present information about the project at a May 2001 meeting of the Denver Coal Club,
- ADA-ES has been invited to participate on the Mercury and Air Toxics Control Panel at the Clean Energy Technology Forum in China (August 28 – September 1, 2001).

Attachment B contains several news releases and announcements on the project.

RESULTS AND DISCUSSION

Field testing began at two sites during the second reporting quarter. A kickoff meeting was held at a third site, and the site was modified to accept hardware components. Detailed results of the testing at each power plant will be provided in separate topical reports.

CONCLUSION

Work began on Cooperative Agreement No. DE-FC26-00NT41005 in October 2000. Initial activities include holding a project kickoff meeting, securing the fourth test site (Alabama Power Company Plant Gaston), and performing various planning and administrative functions. Field testing began during the second reporting period, and test planning for the remaining sites began. Technology transfer activities are progressing at a rapid pace. Interest in participating in the project by third parties (sorbent developers/suppliers and power generating companies) is growing.

REFERENCES

None this report.

LIST OF ACRONYMS AND ABBREVIATIONS

AWMA	Air & Waste Management Association	ICAC	Institute of Clean Air Companies
COHPAC	Compact Hybrid Particulate Collector	OPG	Ontario Power Generation
DOE	Department of Energy	PRB	Powder River Basin
EEC	Environmental Elements Corp.	PSI	Physical Sciences Inc.
EPA	Environmental Protection Agency	QA/QC	Quality Assurance/Quality Control
ESP	Electrostatic Precipitator	WEPCO	Wisconsin Electric Power Co.

ATTACHMENT A

Accomplishments and Status Assessment January 1 – March 31, 2001

General

- Arranged for no-cost lease of carbon injection system from Norit.
- Held discussions with EnviroCare relative to flue gas cooling systems.
- The team received a request from Ontario Power Generation to join in the project. Discussions were held with OPG, DOE and team members about the request. There was a consensus to allow OPG membership where OPG would contribute \$200,000 in cost share funds to the program.
- Two papers were prepared for presentation at the 2001 Annual A&WMA Meeting. The titles are "Field Test Program to Develop Comprehensive Design, Operating and Cost Data for Mercury Control Systems on Non-Scrubbed Coal-Fired Boilers" and "Mercury Removal Trends in Full-Scale ESPs and Fabric Filters."
- Abstracts on the Gaston program and ICR Analysis were prepared and submitted for the Mercury Specialty Conference in August. We are anticipating two additional papers for the meeting –Testing at Salem Harbor and Testing at Wisconsin Electric.
- Commitments were also made to present information on the project to the annual ICAC Meeting (May 3-5) and to a Western Coal Council meeting ("Burning PRB Coal: Risk Management Strategies and Tactics," April 24-26).
- An abstract on the project was prepared for the Clean Energy Technology Forum.
- OPG and ADA-ES issued a joint news release announcing OPG participation in the project.

Alabama Power Company Plant Gaston

- Prebaseline testing was completed in January.
- Parametric testing began in March.
- Southern Research Institute performed baseline Ontario Hydro stack testing.
- Carl Richardson testing ESP ash, COHPAC ash, Norit carbons, and TDA sorbents for mercury capacity.
- Followed up with Charlie Sedman on testing one of EPAs sorbents at Gaston. Charlie sent lime samples to Carl Richardson for testing.
- Received request from Larry Monroe to test char material for mercury removal ability.
- Health and Safety Plan prepared.
- Evaluated whether ESP hopper ash could be acquired and ground for use as an alternative sorbent. It was determined that this could not be done in the time frame required for the parametric testing, and therefore abandoned.
- Coal and ash sampling requirements were discussed with PSI. PSI will coordinate arrangements with Microbeam Technologies for analysis.
- Coal and ash sampling procedures were established.
- QA/QC plan for long-term testing series drafted and distributed for review.

Wisconsin Electric Power Company Pleasant Prairie Power Plant

- A site kickoff meeting was held with WEPCO on January 25, 2001 to plan out the site testing scheduled for the Fall of 2001. A plant outage is scheduled for March, and site prep work and site visits are planned at that time by team members while the P4 site is available for inspection and prep activities.
- EEC ran an ESP model to evaluate maximum sorbent injection rates before opacity problems would develop. Results indicate that injection rates would need to be greater than 5,000 pounds per hour before problems would develop.
- Site Test Plan drafted and distributed for comment.
- Drawings of ductwork received from WEPCO. Preparing designs for port locations. Port installations were made in March.
- Prepared a request for testing a spray cooling system at P4. WE accepted the proposal and spray cooling will be included in the test plan.
- Scheduled prebaseline/screening tests for the last week of May on Unit 2.

PG&E NEG Salem Harbor Station

- A site visit was made to discuss the prebaseline testing planned for February. Schedules and requirements were finalized. Connie Senior of PSI prepared a memo on ash sampling.
- Test matrix prepared and distributed.
- Drawings were prepared for test port locations and layouts. Requested enclosures, scaffolding and power availability.
- A revised prebaseline test plan was issued early in February to include the use of three S-CEM analyzers. The project is leasing two S-CEM analyzers from Apogee Scientific. The third analyzer was provided by EPRI at no cost to the program.
- Prebaseline testing was conducted on Units 1 and 3.
- Prepared preliminary report of prebaseline testing. Sent to PG&E NEG for review.
- PSI is coordinating the analysis of ash samples with Microbeam. Chain of custody procedures implemented.

ATTACHMENT B

Press Releases and Announcements

Case Study: Hamon Research- Cottrell to co-fund DOE mercury reduction demonstration program 2/28/2001

An advanced, Compact Hybrid Particulate Collector (COHPAC) system provided by Hamon Research-Cottrell of Somerville, NJ, has been selected by U.S. Department of Energy (DOE) for a full-scale pulse jet fabric filter (baghouse) demonstration test to evaluate mercury reduction in coal-fired power stations.

This field test joins three other designated full scale electrostatic precipitator (ESP) tests as part of a combined, \$6.7 million contract awarded by the U.S. Department of Energy National Energy Technology Laboratory (DOE/NETL) to ADA-Environmental Solutions (ADA-ES), a subsidiary of Earth Sciences Inc., Littleton, CO.

This will be the nation's first full-scale program to test advanced mercury control technologies. The technologies will be used by power generating companies to comply with potential future EPA regulations for mercury emissions from the nation's coal-fired power plants.

Hamon Research-Cottrell, in cooperation with ADA-ES and Alabama Power, a subsidiary of Southern Co., will be installing this equipment on boiler #3 at their E.C. Gaston Steam Plant located in Wilsonville, AL. A total of two boilers at their E.C. Gaston facility are already successfully operating with Hamon Research-Cottrell-supplied COHPAC technology, which is currently being utilized for particulate control.

The system to be used by the Gaston plant incorporates a transportable, dry sorbent injection system developed for this series of projects. The Hamon Research-Cottrell COHPAC technology utilizes a high air-to-cloth ratio low pressure/high volume (LPHV) pulse jet collector (baghouse) located between an existing ESP and the stack. Chemical sorbents - in this case, activated carbon - are to be injected into the flue gas after the ESP section. The carbon adsorbs the mercury and is collected on the filter cake in the baghouse downstream of the energized ESP, resulting in substantial emissions reduction.

The Hamon Research-Cottrell COHPAC process incorporates licensed, patented technology originally developed by the U. S. power industry under sponsorship of EPRI. This technology was especially developed for retrofitted multi-pollutant control, which includes Hg, SO₂, HCl and particulate, depending on the specific sorbents employed.

Hamon Research-Cottrell has successfully provided the COHPAC technology on four coal-fired utility boilers to date with capacities up to 600 MW, as well as two boilers as part of a MACT compliance project for the SEMASS Resource Recovery Facility. The SEMASS facility is a waste-to-energy plant in Rochester, MA, operated by American Ref-Fuel Co. of Houston, TX.

Under the DOE/NETL cooperative agreement, ADA-ES is working in partnership with PG&E National Energy Group; Wisconsin Electric, a subsidiary of Wisconsin Energy Corp.; Alabama Power Co., EPRI and Hamon Research-Cottrell. DOE will fund 70 percent or \$4.5 million of project costs, with participating companies co-funding the remaining 30 percent or \$2.3 million.

Hamon Research-Cottrell is part of the Hamon Group, which specializes in the design, engineering, fabrication, and construction of cooling systems, chimneys, heat exchangers, heat recovery, and pollution control systems.

Source: Hamon Research-Cottrell



Ontario Power Generation Joins ADA-ES Mercury Project Team

LITTLETON, COLO. – March 19, 2001 – Environmental technology and specialty chemical company ADA-ES, a subsidiary of Earth Sciences (OTCBB: ESCI), announced today that Ontario Power Generation (OPG) has joined its mercury control project team and will provide significant funding to cover project costs.

In October 2000, ADA-ES began work on a comprehensive mercury emissions control program to evaluate the technology that power generating companies will use to comply with new mercury regulations that will be proposed by the U.S. Environmental Protection Agency in 2003. This work is being performed under a \$6.8 million cooperative agreement with the U.S. Department of Energy National Energy Technology Laboratory (DOE/NETL).

As one of the largest electric utilities in Canada, OPG has been closely following the developments of mercury control technologies in the U.S. and has been on the forefront of investigating methods to control the emission of mercury into the environment.

“We welcome Ontario Power’s participation on the program team. They will be a valuable member of the team and bring their many years of experience in emissions controls. In fact, a standard testing method used in the U.S. for evaluating mercury releases from fossil-fueled generating stations was developed by and is named for OPG’s predecessor,” said Michael Durham who heads the project for ADA-ES.

Under the DOE/NETL cooperative agreement, ADA-ES is working in partnership with PG&E National Energy Group, Wisconsin Electric, a subsidiary of Wisconsin Energy Corp., Alabama Power Company, a subsidiary of Southern Company (NYSE:SO) and EPRI. The DOE will fund \$4.5 million of the \$6.8 million project while the other participating companies will co-fund the remaining \$2.3 million.

“OPG is pleased to be supporting this exciting mercury project,” said Blair Seckington, Senior Technology Advisor for Ontario Power Generation. “We are encouraged that this project will help move mercury reduction technology out of the laboratory and test its commercial viability.”

During the three year project, mercury control systems will be installed and tested at four coal-fired power plants. ADA-ES has developed a mercury control system where sorbents are injected into the flue gas and collected by existing particle collection systems. The sorbents will absorb the mercury, resulting in substantial emissions reduction. According to the DOE's National Energy Technology Laboratory, which is spearheading the project, the goal is to

develop a cost-effective technology that will allow the electric utility industry to reduce mercury emissions from power plants by up to 70 percent of current levels.

About ADA-ES

Headquartered in Littleton, Colo., ADA-ES is an environmental technology and specialty chemical company that brings 25 years of experience to improve responsible profitability for electric power and industrial companies through proprietary products and systems that mitigate environmental impact while reducing operating costs.

ADA-ES is a subsidiary of Earth Sciences, whose common stock trades on the OTCBB under the symbol ESCI.

About Ontario Power Generation

Ontario Power Generation is an Ontario based generating company whose principal business is the generation and sale of electricity to consumers in Ontario and into the interconnected markets. OPG's goal is to be a premier, low-cost power generation and wholesale energy sales company in its market area, while operating in a safe, open and environmentally responsible manner.

This press release may contain forward-looking information within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934. The United States Private Securities Litigation Reform Act of 1995 provides a "safe harbor" for such forward-looking statements in this document that are based on information the Company believes reasonable, but such projections and statements involve significant uncertainties. Actual events or results could differ materially from those discussed in the forward-looking statements as a result of various factors including but not limited to changing market demand for ADA-ES chemicals and systems and changes in technology, laws or regulations, demand for the Company's securities, and other factors discussed in the Company's 1999 Form 10-KSB and recent Form 10-QSBs.

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